



Adoption rates for laparoscopy in colorectal surgery: why are they lagging behind?

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During the last three decades, the laparoscopic revolution shook the world. The advantages of the laparoscopic approach compared to open surgery are indisputable: reduced post-operative pain, reduced suppression of pulmonary function, less wound complications, quicker return of bowel function, fewer adhesions, shortened hospital stay, earlier recovery, better cosmesis and reduced costs as compared to laparotomy (1–4). Understandably, laparoscopy now represents the standard approach for most surgical procedures, including appendectomies, cholecystectomies and bariatric procedures. However, colorectal surgeons have been late and slow to adopt the laparoscopic approach, as reflected in this current paper by Davis and colleagues (5). These findings further amplify the results of earlier publications.

Rea *et al.* evaluated laparoscopic approach adoption in the early 2000s using the Nationwide Inpatient Sample. The rate of laparoscopic colectomy for benign disease increased from 6.2% in 2001–2003 to 11.8% in 2005–2007, and from 2.3% to 8.9% for cancer, respectively (6).

A study from the National Surgical Quality Improvement Program (NSQIP) database between the years 2006–2007, found an adoption rate of 31.1% for laparoscopy in colorectal surgery (7). Davis *et al.* (5) reported a laparoscopic approach utilization of 22.7% in 2005, rising to 49.8% in 2014, also based on data from NSQIP.

Kwon *et al.* looked at the regional adoption rates for laparoscopy in colorectal surgery, in a community setting, in the state of Washington and Portland Oregon between the years 2005–2010 (8). During the course of the study period,

the utilization of laparoscopy increased from 23.3% in 2005 to 41.6% in 2010. In a prior study of the Nationwide Inpatients Sample database, laparoscopy was utilized in 55.4% of the total of 309,816 patients who underwent elective colon resection between 2009–2012. This rate increased during the course of the study, both in urban (53.6% *vs.* 61.6%) and rural hospitals (33.4% *vs.* 42.3%), for both benign (33.4% *vs.* 42.3%) and malignant indications (45% *vs.* 53.5%) (9).

This disparity between utilization of laparoscopy based on the hospital setting being urban *vs.* rural, high *vs.* low volume centers and indications has been demonstrated in several other papers (8,10,11). The actual rates for the laparoscopic approach may be lower than what was reported in the current work by Davis *et al.* (5) in non-NSQIP data sources.

While adoption rates for laparoscopy seem to be on the rise, they are still relatively low compared to other fields of surgery. There are several explanations for this phenomenon, including the complexity of colorectal procedures, which involve multi-quadrant surgeries, the need to control large vascular pedicles, difficult visualization, retraction and dissection during pelvic dissection, large specimen volumes and construction of an anastomosis. These features make laparoscopic colorectal surgery technically demanding, requiring complex tools, increasing operative times and protracted learning curves. In addition, early concerns over port site metastasis raised the question of oncologic safety (12,13).

The adoption rates for laparoscopic rectal cancer surgery are significantly lagging, as this approach necessitates advanced laparoscopic skills and technical expertise in order

to perform a complete mesorectal excision. Further advances in the approach to rectal cancer surgery, including transanal total mesorectal excision (TaTME) and robotic TME, may facilitate adoption of minimally invasive rectal cancer surgery. In addition, educational modules such as fundamentals of laparoscopic surgery (FLS), as well as educational platforms including the AIS channel (14), d-live (15), touch surgery (16) and GIBLIB (17) may enhance surgeon education. Furthermore, as practicing non-laparoscopic surgeons retire, the work force will become more robustly populated with surgeons adept at laparoscopic colorectal surgery.

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